



**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
RAILWAY BOARD**

No. 2019/Track-III/CS/1

New Delhi, dated 14.11.2022

**The General Managers,
All Zonal Railways.**

Sub: Installation of RFID Tags on Indian Railway track in connection with Track Recording.

Ref: Principal Executive Director/Infra-1, RDSO letter No.TM/IM/1 dated 01-08-2022

Principal Executive Director/Infra-1, RDSO vide above referred letter (copy enclosed) has highlighted the advantages of using new Track Recording Cars (TRCs) provided with synchronization feature with RFID tags as a result of which synchronization happens at the exact location where the tag is fixed, thus minimizing the error due to synchronization and facilitating field engineers to reach correct location of any defect of track.

Besides above, in the new TRC systems, defects related to other than track defects geometry such as Infringement of various SODs, shortcomings and defects of track components, acceleration peak values at Axle box level, Rail wear are also being reported which can also be accurately located if synchronization using RFID tags is carried by TRCs.

Considering the above and other advantages, Zonal Railways are advised to procure and install RFID tags as detailed in the letter of RDSO referred above. For any further clarification, PED/Infra-1 RDSO may be contacted.

DA: As above

Vijay
14.11.2022

**(VIJAY SINGH)
DIRECTOR TRACK (MACHINES)
RAILWAY BOARD
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Copy to :

- 1) The Principal Chief Engineer(s), All Zonal Railways
- 2) Principal Executive Director/Infra-1/RDSO, Lucknow for information and necessary action



भारत सरकार - रेल मंत्रालय
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Government of India-Ministry of Railways
Research Designs & Standards Organisation
Lucknow - 226 011
DID (0522) 2450115
DID (0522) 2465310



No. TM/IM/1

Dt: 01.08.2022

ED/TK (M&MC)
Railway Board
New Delhi

Sub: Proposal for installation of RFID Tags on Indian Railway track in connection with Track Recording.

Ref: 1) Specification of tags circulated vide CRIS letter no.2016/CRIS/NDLS-HQ/CC/Project /RFID/0225/Pt-1 dated 05.10.18

2) RDSO letter no.MW/RFID dated 18.04.2019 regarding suitable RFID Tags sources.

3) RDSO's technical Specification no. TM/IM/382

4) Guidelines for Data on board RFID Tags of the Indian Railways Track.

1. Different track defects are being identified by track recording car which is intern being used by P. Way engineers for maintenance of track. For exact location identification of TRC with ground chainage, route data tape is being used. Frequent synchronisation of route data tape with TRC's exact location is required to correct the error accumulated due to sinusoidal motion of the trolley and varying diameter of wheel therein.
2. Presently this synchronisation is done manually, which has significant error due to high speed of TRC. To overcome this issue, new TRCs have been provided with synchronisation feature with RFID tags and have been tested in the field. By this method, the synchronisation happens at the exact location where the tag is fixed and hence the error due to synchronisation is minimized. Synchronisation is also possible to be done with GPS signals, but the same will have errors from 5-10 m in best case scenario. The error may be more depending upon availability of satellite signals, weather conditions and also when TRC is in Deep cuttings, forest and tunnel areas. Thus based on above synchronisation with RFID is preferable.
3. In new TRC systems, defects related to other than track geometry such as Infringement of various SODs, shortcomings and defects of track components, acceleration peak values at Axle box level, Rail wear are also being reported. Synchronisation with RFID tag will facilitate field engineers to reach correct location of any defect of track.
4. SOD profile of station limits and other than station limits are quite different, therefore it is desirable to fix the RFID tag at both ends on station limits in all lines of a station on all the routes of the Indian Railways. However, to start this exercise, in the beginning, it can be fixed on NDLS-HWH or NDLS-CSTM route. Sample calculation for tentative cost implications for fixing of RFID tags on NDLS-CSTM route is annexed at Annexure-5.
5. Details for writing and fixing of RFID tags along with specification of tags, relevant provision in technical specification of ITMS, probable sources, guidelines for writing of information on tags & location and method of fixing in this regard are annexed.

It is therefore requested to direct Zonal Railways for fixing of RFID Tags on Track as proposed.

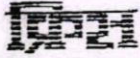
DA: As above

(S.C. Srivastava)

Principal Executive Director/Infra-1

Details for Writing and Fixing of RFID Tags.

1. The RFID tags to be installed at tracks of IR shall be procured, confirming to the standards as per the ***"Specification of Tags for use for Identification of Vehicles on Indian Railways (V 4.1)"*** (Annexure-1/A) and excerpts of ***"Technical specification for Integrated Track Monitoring System (Specification No. TM/IM/382)"*** (Annexure 1/B), related to Tag along with list of probable vendors (Annexure 1/C) is attached.
2. The RFID reader installed in the Integrated Track Monitoring System (ITMS) is of make FEIG Electronics, model no. ID ISC.LRU3500-EU and its technical data sheet is attached as annexure-2
3. The writing of the RFID tags will be done as per ***'Guidelines for Data onboard RFID Tags of the Indian Railways Track'*** attached as annexure-3.
4. Location of fixing of RFID tags will be at the exact chainage of start and end of station limit for each line, indicative line diagram of a single line and a double line section is attached for reference as annexure-4.
5. The RFID tags are to be mounted on sleepers at the sleeper top level. These are to be pasted within ± 100 mm of the center of the sleeper.(For Details please refer, excerpts of Specification No. TM/IM/382 related to Tags attached as annexure-1).
6. These tags are to be fixed to sleeper by a good quality, all weather epoxy based adhesive such as Pidilite, FEVITITE Epoxy Adhesive, Super Strong All Purpose Epoxy Adhesive, Araldite Standard Epoxy Adhesive, 3M Scotch-Weld Epoxy Adhesive, etc.



रेलवे सूचना प्रणाली केन्द्र

(रेल मंत्रालय भारत सरकार का संगठन)

CRIS

CENTRE FOR RAILWAY INFORMATION SYSTEMS
(An Organisation of the Ministry of Railways, Govt. of India)

No.: 2016/ CRIS/ NDLS-HQ/CC/PROJECT/RFID/ 0225/ Pt-1

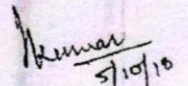
05/10/18

EDME/ Fr,
Railway Board,
New Delhi 110001

Sub: Specification of Tags for use for Identification of Vehicles on Indian Railways (V4.1)

Ref: This office's letter of even no. dated 27/04/18 (for specification.)

- 1 Vide reference above Specification of RFID Tags (v4.0) was issued.
- 2 The new revised version (v4.1) of the specification for RFID tags for the Indian Railways is attached herewith incorporating some minor changes.
 - 2.1 The drawing sketch of RFID tag incorporates a few minor changes and has been updated to VD,1
 - 2.2 A few paras, as enumerated in the change list of revised specification, have been reworded/renumbered to bring in more clarity.
- 3 The EOI for vendor registration for RFID tags has been done as per version 4.1.
- 4 The new revised version (v4.1) of the specification for RFID tags for the Indian Railways is attached for necessary action at your end.


GM/ IC/ CRIS

Encl: As above in 8 pages

Copy for information and necessary action to:

EDS(W), EDS(Chg) - RDSO, Manak Nagar, Lucknow, CAO/ COFMOW

EDME/ Dev; EDME/ Chg; EDEE/RS - Railway Board, New Delhi

No.: 2016/ CRIS/ NDLS-ITPI/ WS-C/ POLICY/ RFID/ 0101/ PT-1

Sub: Specification of Tags for use for Identification of Vehicles on Indian Railways (V4,1)

CHANGE LIST (of latest changes):

V4,1:

- Para 2.7 – combined relevant portions of the earlier para 2.8.
- Para 3.3 – dropped since duplicate; *succeeding paras renumbered.*
- Para 3.4 – the word ‘material’ added to clarify
- Para 3.5.1.6 – Paras 3.5.1.6.1 & 3.5.1.6.2 merged in and reworded accordingly. In the table: s/n 2 standard reference corrected, s/n 5, 9, 10 and 12 test detail clarified.
- Para 3.5.2 & 3.5.3 – reworded for clarity. Agency approval reworked.
- Para 3.5.3.2 – Para number referred to corrected.
- Para 3.5.4 – Renumbered and reworked.
- Para 5.2 – reworded to make it clear.
- Drawing sketch updated to VD,1

V4,0:

- Para 1.5 – Elements moved to Para 2 (Design Basis) and Para 3 (Specifications)
- Para 1.6 – Moved to Para 2 (Design Basis)
- Para 2.1 – Moved to Para 3.1 and standard revised to V2 from v1.2
- Para 2.2.1 – Moved to Para 2.1
- Para 2.2.2 – Moved to Para 2.2
- Para 2.3 – Moved to Para 2.6
- Para 2.4 – azimuth angle changed to 90° from 110°
- Para 2.5 – Moved to Para 3.2
- Para 2.6 – Moved to para 3.3 and renamed as ‘Tag dimensions’
- Para 2.7 – Revised and moved under para 3.5.1.6
- Para 2.8 – Revised and moved to para 3.4
- Para 2.9 – Moved to para 4.
- Para 2.10 – Moved to para 5.
- Para 2.11 – Moved to para 7.
- New Para 2 created on ‘Design basis’: All elements moved in from earlier specification’s para as indicated above.
- New Para 3 – Added para on ‘Specifications’. Moved in some elements from earlier specification’s para as indicated above.
- New Para 6 added on ‘Requirement of Country Code for privately owned wagons’.

PTO...

1 BACKGROUND:

1.1 The tags are for use with ALL types of Rolling Stock of the Indian Railways as well as major assemblies. These shall be an integral part of the Rolling Stock or the assembly itself.

1.2 The tags for vehicles shall be mounted on metal nominally at sole bar level. The base metal can be steel, stainless steel or aluminium as per relevant Indian Railways standards. For assemblies, the location shall be specified for each use case separately.

1.3 The tag specifications shall, in general, be as per GS1 standards and broadly aligned with the 'European Guideline for the Identification of Railway Assets using GS1 Standards'. The basic encoding standard applicable is GIAI-202 of GS1.

1.4 For understanding the data formats for use on the tags please read the latest version of the associated document 'Guidelines for Data onboard RFID Tags of the Indian Railways'.

2 DESIGN BASIS

2.1 Metal mount type of tags.

2.2 Generic: All standards as applicable for use of UHF RFID tags in India are applicable.

2.3 Railway's Working Environment:

2.3.1 The tags will work in conditions of EMI/RFI since 25kV AC is used in overhead lines on tracks. Also, at the time of maintenance electric welding shall be done close to tags.

2.3.2 Trains run under the most severe climatic conditions. This includes sandstorms, pelting rain, snow, heat, vibrations etc.

2.4 Dynamic Performance: Minimum read rate based on circularly polarised reader antennas with 90° or more azimuth angle at a minimum distance of 1.5m under clear conditions with RSSI of -75 or better at 110 kmph. ∴..... 10 reads

2.5 Data Retention: Tags should be able to retain data for a period of 20 years or more.

2.6 Memory:

2.6.1 EPC memory suitable for GIAI-202 encoding. This area shall be password locked for write only.

2.6.2 User memory of 3 kb or higher. It is expected that the user memory shall be logically split into four functional areas (please read the latest tag data guidelines document in this connection)

2.6.3 Read-Write cycles endurance 100,000 cycles

2.7 Tag Housing:

2.7.1 Life of housing material is expected to be 20 years or more.

2.7.2 Fixing Arrangement: The tag is expected to be directly attached to the solebar using fasteners to the vehicle body. The fastener will be 1/4th inch (approximately 6.3 mm) in diameter.

2.7.3 For some specific rolling stock the fastening system may be different and shall be specified later.

2.7.4 The tags are to be fitted as per the relevant drawing for that particular vehicle/ assembly.

3 SPECIFICATIONS:

3.1 **Base standard:** EPC Gen2 V2 or higher.

3.2 **Static Performance:** Static performance shall be measured, in principle, as per TIPP (Tagged Item Performance Protocol) Testing Methodology R1.0. However, the following variations in test conditions would apply:

3.2.1 Tag shall be tested while mounted centrally using non-break stem fasteners on a IS-2062 plate with a size of 300 mm x 100 mm with 8 mm thickness, i.e., similar to actual working conditions.

3.2.2 Tag shall be kept on the test platform with the backing plate vertical, i.e., similar to condition of actual operation.

3.2.3 The measuring equipment shall run parallel to the tag backing plate at a distance of 1.5m in a manner similar to the usage in the Railways. The orientation of the tag relative the measuring equipment shall not be changed during the test

3.2.4 Measurements would be limited to elevation angles of 0° and 30° only (antenna 1 and 2 positions).

3.2.5 Platform orientation shall be limited to azimuth angles of 0° and 60° .

3.2.6 Commonly, the worst case scenario could be 60° azimuth and 30° elevation.

3.2.7 Accordingly, Sensitivity should be as under:

3.2.7.1 The best case sensitivity should be equal or better than -17 dBm

3.2.7.2 The worst case values should be more than -25.5 dBm, i.e., the variation between the worst case and the best case should 50% or less, keeping in mind that the scale is negative.

3.3 **Tag Housing Material:** The material of the housing should be such that it does not have a permanent set exceeding 0.5 mm at the boss when clamped with a force of 18 kN.

3.4 **Tests & Verification:** The equipment shall be tested for functional capability, ability to withstand environmental conditions and for reliable performance under simulated field conditions as set forth below:

3.4.1 **Type tests:** These tests shall be done on a sampled lot of RFID tags. Such tests are required if any of the below criterion applies:

3.4.1.1 First approval of the tag manufacturer,

3.4.1.2 Change of this specification,

3.4.1.3 Change by manufacturer of his design and

3.4.1.4 Change by manufacturer of his manufacturing processes.

3.4.1.5 The manufacturer will be required to submit 8 (eight) prototypes to CRIS out of which one pair will randomly selected for type testing. At the actual time of testing one out of the pair shall be randomly chosen for the actual test and the other retained as control sample..

3.4.1.6 Tags shall be subjected to the following tests to be carried out by a reputed agency certified to carry out the same.

S/n	Parameter	Standard	Test Detail
1	Visual inspection	None	Visual inspection shall be carried out on all samples to ensure that there is no major damage
2	Dimensions of RFID Tags	As per drawing attached with this document.	—
3	Marking	As per para 4 of this document.	—
4	Static Performance	As per para 3.2 of this document.	—
5	Shock test	AAR S-5702	As per clause no. 3.2.4.3.3 (of the AAR specification)
6	Spillage of liquid on housing of Tags	MIL-STD-810G Method 504.1 procedure II (clause 2.2 b)	Only with the following in Table 504.1-II: 1. Petrol [Gasoline, commercial] 2. Simulated sea water 3. Other Solvents (Isopropyl alcohol (2-propanol), acetone, etc)
7	Ingress Protection	IEC 60529	IP66
8	Impact protection	IEC 62262	IK10
9	Cold Test	IEC 60571	At -20°C for 16 hours as per clause 12.2.15 of the specification
10	Dry heat Test	IEC 60571	70°C for 16 hours as per clause 12.2.5 of the specification
11	Damp heat test, cyclic	IEC 60571	—
12	Salt mist test	IEC 60571	Class ST4 in the specification
13	Vibration Tests (Simulated Long Life Testing)	IEC 60571	As per Category 2 of clause 9 in the connected specification IEC 61373

3.4.2 Routine tests: These tests are required to verify that the product is manufactured to the required quality standards set by the OEM themselves. Routine tests shall be conducted by the tag manufacturer as per their own quality assurance plan (QAP) during manufacturing. The QAP itself shall require prior approval from CRIS.

3.4.2.1 Records maintained during manufacture shall be made available for inspection by an agency so approved jointly by CRIS along with the tenderer.

3.4.3 Acceptance tests: The acceptance test shall include:

3.4.3.1 Verification of type test reports, routine test conducted at manufacturer's premises.

3.4.3.2 Functional tests of the equipment as per item 1 to 3 from para 3.4.1.6 above.

3.4.3.3 Multiple write followed by read test. At least 10 full cycles to be carried out in immediate succession. One set at 0° and another set at 45° azimuth. No errors should be found in either a write operation or in a read after a write.

3.4.3.3.1 This test is to be done using portable readers. For each model of portable reader, CRIS shall indicate the distance from which the test is to be carried out – this information is model specific and as such cannot be given generically.

3.4.3.4 These tests shall be done by an agency so approved jointly by CRIS along with the tenderer, based on sampling plan given below for regular supply.

Manufacturing Batch size	Sample size
0-250	5
251-1000	10
1001-5000	15
more than 5000	20

3.4.3.5 Manufacturing batch here refers to the tags manufactured from a single combination of raw materials, i.e., a change in any of the raw materials used for tag manufacture shall imply a separate manufacturing batch.??

4 Tag marking:

4.1 To be done at the back of the tag such that it is easily readable and is not obscured/ rubbed out over time due to vibration etc.

4.2 It should be moulded in raised letters as per tag drawing and indicate at the very least:

- 4.2.1 Manufacturer's identification mark.
- 4.2.2 Year (YY) and month (MM) of manufacture
- 4.2.3 Manufacturing Batch
- 4.2.4 Packaging Lot (optional)

4.3 QA/ QC marking of the manufacturer in the form of a Non-removable Holographic sticker on each tag.

5 Packaging of Tags:

5.1 10 tags to be kept in One package, each tag to be temporarily numbered individually using permanent marker/ sticker or equivalent. Such 10 tags to be kept in a suitable cardboard box or plastic pouch.

5.2 Each box should contain a sheet with the list of TIDs (of the tags in that box) with space in front of each TID so that it is possible to record wagon id as and when the tag is installed.

5.3 Each package, whether secondary or tertiary should have an associated Datamatrix or barcode on it with the corresponding HRI available on the package to identify the same. These should be as per the relevant GS1 standards.

5.4 Damage protection during transit to be ensured

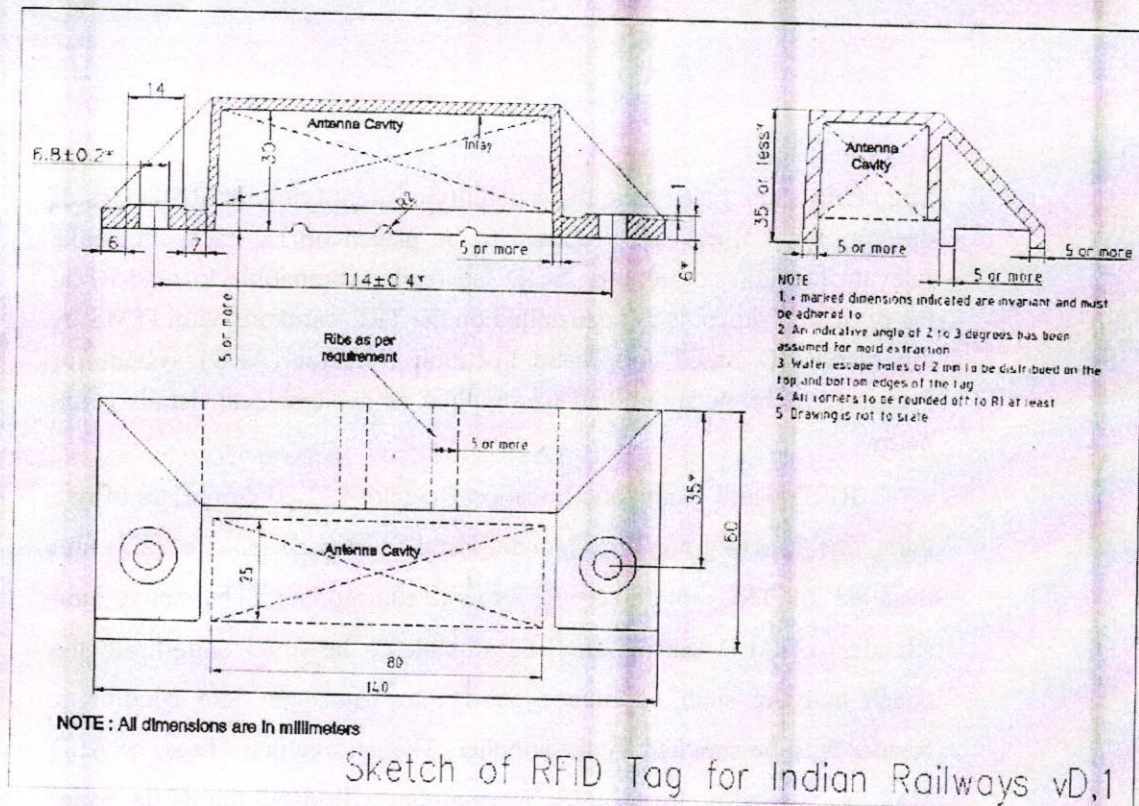
5.5 Holographic seal on each tag and package from the manufacturer to indicate their original nature.

6 Requirement of Country Code for privately owned wagons: All RFID tags fitted on vehicles running over the Indian Railways need to necessarily identify the owner of the vehicle as per the relevant international standards. As such, for privately owned wagons in India, their owning companies need to get a Company Code from GS1 India.

7 Warranty: Each tag shall be warrantied for two years from the date of fitment, i.e., the date when the tag has valid data written into it for the first time and this data is available for monitoring.

– X –

Schematic drawing for Tag



Technical Specification for Integrated Track Monitoring System

5.7 Route Feature Information and Synchronization:

A.

.....

.....

- B. The ITMS should also have the capability of identifying the RFID tags of open protocol which are proposed to be placed on IR track and make relevant location corrections. RFID tag reader compatible to read RFID tag of open protocol is to be installed on the TRC car along with ITMS by the firm. RFID based Automatic Location Detector (ALD) system for location synchronization shall be supplied as per technical details given below:

RFID based Automatic Location Detector (ALD) comprises of two parts, one passive ground transponder installed in track and one active unit installed in TRC to detect the ground transponder. The active unit (Reader) of ALD sensors shall be suitable to be fitted underneath the coach body & shall be rugged enough to withstand field conditions. Reader is to be supplied by the supplier. The passive unit (Tags) of ALD shall be installed on track by IR. The supplier will install the RFID reader compatible with RFID tag of open protocol as per specification details given below

- The ground/track installed tags are used with all types of Sleepers of the Indian Railways. These are typically placed at least 150 mm away from center (± 150 mm) of the sleeper, in-between the two rails.
- The tags on sleepers are mounted at sleeper top level. The base metal is steel, stainless steel or aluminum as per relevant Indian Railways standards.
- The tag specifications are, in general, as per GS1 standards and broadly aligned with the 'European Guideline for the Identification of Railway Assets using GS1 Standards'. The basic encoding standard applicable is SGLN195 of GS1.

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Prepared By:	Issued By:	

Technical Specification for Integrated Track Monitoring System

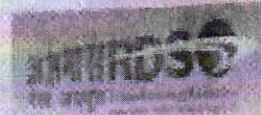
- (d) For understanding the data formats for use on the tags please read the associated document 'Guidelines for Data onboard RFID Tags of the Indian Railways Track' attached as annexure -III.
- (e) The tag reader should work in conditions of EMI/ RFI as 25kV AC or 2x25 kV AC is used in overhead lines on tracks..
- (f) Base standard of Tag being used will be: EPC Gen2 V1.2 or higher.
- (g) Generic information on Tag:
- Concrete / metal mount type of tags.
 - All standards as applicable for use of UHF RFID tags in India are applicable.
- (h) The RFID Tags have a user memory of 3 kb or higher.
- (i) Dynamic Performance of Tag used by IR: Minimum read rate based on circularly polarized reader antennas with 110° or more azimuth angle at a minimum distance of 1.0m and maximum distance of 2.0m up to a speed of 200 kmph.
- (j) Sensitivity of tags is as under:
- The best case sensitivity is equal or better than 17 dBm
 - The worst case values are more than 25.5 dBm, i.e., the variation between the worst case and the best case should 50% or less, keeping in mind that the scale is negative.
- (k) Tags used by IR are as per IP68 housing standards. TRC will run under the most severe climatic conditions. This includes sandstorms, pelting rain, snow, heat, vibrations etc. Therefore, there should be no concern in reading the data from the tag under such conditions.

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Prepared By:	Issued By:	



भारत सरकार, रेल मंत्रालय
अनुसंधान, डिजाइन और मानक संगठन
लुधियाना - 226011
फोन: 01823-2452494
टेली फोन: 01823-2465773

Government of India - Ministry of Railways
Research Designs & Standards Organisation
Lucknow - 226011
DID (0522) 2450115
DID (0522) 2465310



No MW/RFID

Date: 18.4.2019

All PCMEs, Wagon Builders, PSU'S, (as per list attached)

Sub Registration and approval of RFID tag vendors.

- Ref (i) CRIS letter NO 2018/CRIS/NDLS-ITPI/WS-C/Policy/RFID/0101/pt 1
dated 08.01.2019
(ii) CRIS letter NO 2019/CRIS/NDLS-ITPI/RFID/Policy/0151/Pt.1
dated 04.04.2019.

Vide reference (i) and (ii) above, CRIS has informed the following RFID tags sources for supply of RFID Tags for use for identification of vehicles on Indian Railways (Version 4.1) till date -

No.	Name of vendor
1	M/S Omania Technologies Pvt. Ltd., Plot No 68, sector-5, IMT Manesar, Gurugram, Haryana-122050
2	ID Tech Solutions Private Limited, Plot no 610, Udyog Vihar phase V, Gurgaon-122016
3	PVL tag factory India Pvt. Ltd., W-1, Sector-11, Noida (U.P.)-201301
4	OMNI-ID India Pvt. Ltd., # 211, V Times square, Plot No 3, sector-15, CBD Belapur, Navi Mumbai, Maharashtra-400614.
5	Syrma Technology private Limited, B-27, Zone-B, Phase-II, MEPZ-SEZ, Tambaram, Chennai-600045.
6	APK Identification, Plot No. 129-B, NESZ Phase-2, Noida (U.P.)-201305.
7	Ecartes Technology Pvt. Ltd., 4805/24, Bharat Ram Road, Daryaganj, New Delhi-110002

For any further information/clarification related to specification, source, inspection procedure and data writing/retrieving from RFID tags, you may directly contact to CRIS Office.

DA Nil

(P K. Pandey)
Director/ Wagon
for Director General/RDSO

Copy to,

- (i) EDME(Freight), Railway Board, New Delhi-110 001
(ii) General Manager/CRIS/RFID, Chanakya Puri, New Delhi-110 021.
(iii) EDQA(Mech.), RDSO, Lucknow-226011
(iv) Director/QA (Mech.), RDSO, Kollaghat Street, Kolkata-700 001
(v) Director/QA (Mech.), RDSO, Shankar Market, Near Scot Building, New Delhi-110 001

12 Technical Data**Mechanical Data**

- **Housing** Plastic enclosure with cooling fin
- **Dimensions (W x H x D)** 261,3 x 157,3 x 68 mm³
10.29 inch x 6.19 inch x 2.68 inch
- **Weight** 2.0 kg (4.4 lb)
- **Enclosure rating** IP 53 (with protection cap IP64)
- **Color** RAL 9003

Electrical Data**Supply voltage**

24 V DC \pm 5 % (Noise Ripple : max. 150 mV)
PoE (Power over Ethernet) (min. 42,5 V DC)
(up to 1Watt reader output power)

optional:

- **Power consumption** max. 35 VA
- **Operating Frequency**
EU Reader 865,7 – 867,5MHz (4 Channel Plan)), -
FCC Reader 902-928MHz (FCC CFR 47 Part 15.247)
- **Transmitting power** 300 mW – 4 W (configurable)
(maximum 1W by PoE)
- **RF-Diagnostic** RF-Channel control, antenna SWR control, internal
overheating control
- **Antenna connections**
- 4 x multiplexing 4 x SMA socket (50 Ω)
- **Outputs:**
- 2 optocoupler 24 V DC \equiv / 30 mA (galvanically isolated)
- 3 relay (1 x normal open) 24 V DC \equiv / 1 A (switching current), (2 A constant load)
- **Inputs**
- 5 optocoupler max. 5-10 V DC \equiv / 20 mA
- **Interfaces**
- RS232
- RS485
- USB (full speed)
- Ethernet (10P/IP)

Functional Feature

- Protocol modes
 - FEIG ISO Host Mode
 - Buffer Reader Mode (Data Filtering and buffering)
 - Notification Mode
 - Scan Mode
- Supported transponders
 - EPC class 1 Gen 2
 - EM4222 / 4444 (optional)
 - 18000-6-B/-C (optional)
- Optical indicators
 - 8 LEDs for operating status and diagnostics

Ambient

- Temperature range
 - Operating -25°C to +50°C (-13°F to +122°F)
 - Storage -25°C to +85°C (-13°F to +185°F)
- Rel. Humidity
 - 5% -95% (not condensing)
- Vibration
 - EN60068-2-6
 - 10 Hz to 150 Hz : 0.075 mm / 1 g
- Shock
 - EN60068-2-27
 - Acceleration : 30 g

Applicable standards

- RF approval
 - Europe EN 302 208
 - USA FCC 47 CFR Part 15
- EMC
 - EN 301 489
- Safety
 - Low-Voltage EN 60950
 - Human Exposure EN 50364

Annexure-3

Annexure-III

Guidelines for Data on board RFID Tags of the Indian Railways Track

EPC area:- The EPC area is ALWAYS read. From the Railways viewpoint it only stores the Information regarding the various features. Additionally, internally there is a lot of information about the Tag that is also stored including a unique identifier for each tag. The data is stored in a format prescribed by an international standard by an organisation called GS1 and the associated standard is GS1 SGLN 195 Allocation Rules.

Sl No	Field	Size	Comments
1	Version No	1	'D' is the default currently
2	Railway Zone	1	See Annexure A
2	Railway Division	2	See Annexure B
3	Track Feature unique Identification Number as in TMS	12	12 Alphanumeric (It is unique no for identification of Track asset in TMS
4	Chainage in KM	4	1000 Km will be written as 1000
5	Chainage in m	5	26.5 meter will be written as 00265

Annexure -A

SL No	Zone	Code
1	Central Railway	A
2	Eastern Railway	B
3	East Central Railway	C
4	East Coast Railway	D
5	Northern Railway	E
6	North Central Railway	F
7	North Eastern Railway	G
8	North Western Railway	H
9	Northeast Frontier Railway	I
10	Southern Railway	J
11	South Central Railway	K
12	South East Central Railway	L
13	South Eastern Railway	M
14	South Western Railway	N
15	Western Railway	P
16	West Central Railway	Q
17	Metro Railway	R
18	Konkan Railways	S

Annexure -B

SL No	Zone	Division	Code
1	Central Railway	Mumbai Division	01
		Bhusawal Division	02
		Nagpur Division	03
		Solapur Division	04
		Pune Division	05
2	Eastern Railway	Howrah	06
		Malda	07
		Sealdah	08
		Asansol	09
3	East Central Railway	Sonpur	10
		Danapur	11
		Dhanbad	12
		Mughalsarai	13
		Samastipur	14
4	East Coast Railway	Sambalpur	15
		Khurda Road	16
		Waltair	17
5	Konkan Railways	KonanRailway	18
6	Northern Railway	Ambala	19
		Delhi	20
		Firozpur	21
		Moradabad	22
		Lucknow	23
7	North Central Railway	Allahabad	24
		Jhansi	25
		Agra	26
8	North Eastern Railway	Varanasi	27
		Lucknow	28
		Izathagar	29
9	North Western Railway	Jodhpur	30
		Bikaner	31
		Jaipur	32
		Ajmer	33
10	Northeast Frontier Railway	Katihar	34
		Alipurduar	35
		Lumding	36
		Rangiya	37
		Tinsukia	38

11	Southern Railway	Chennai	39
		Madurai	40
		Palakkad	41
		Thiruvananthapuram	42
		Tiruchirappalli	43
		Salem	44
12	South Central Railway	Hyderabad	45
		Secunderabad	46
		Vijayawada	47
		Guntakal	48
		Guntur	49
		Nanded	50
13	South East Central Railway	Bilaspur	51
		Nagpur	52
		Raipur	53
14	South Eastern Railway	Adra	54
		Chakradharpur	55
		Kharagpur	56
		Ranchi	57
15	South Western Railway	Hubballi	58
		Mysuru	59
		Bengaluru	60
16	Western Railway	Vadodara	61
		Ahmedabad	62
		Rajkot	63
		Bhavnagar	64
		Ratlam	65
		Mumbai	66
17	West Central Railway	Jabalpur	67
		Kota	68
		Bhopal	69
18	Metro Railway	Kolkatta	70

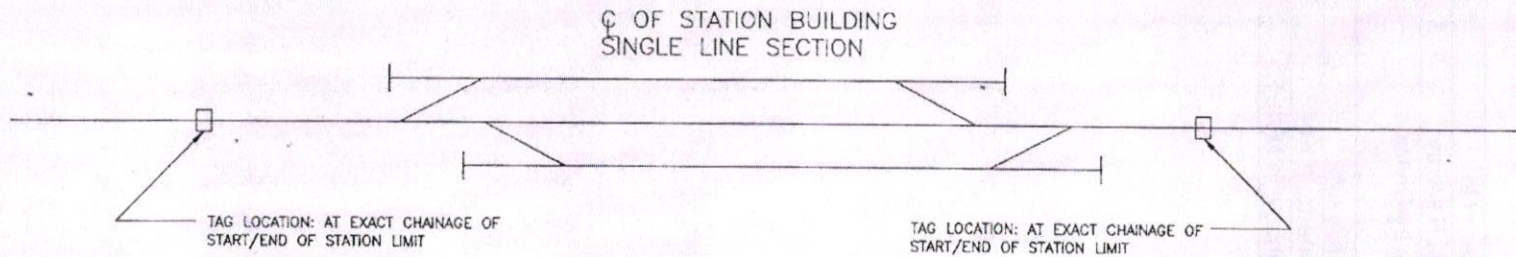
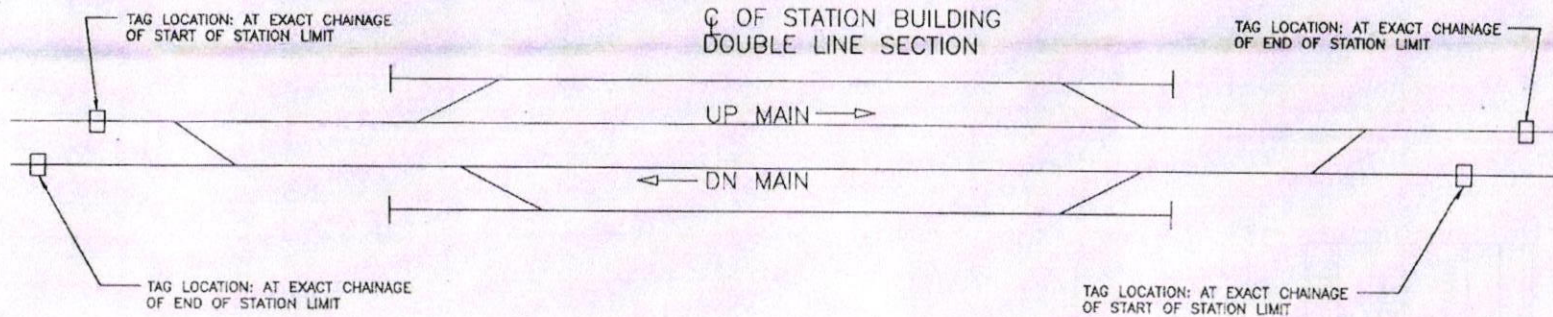
Example:-

DE23123456789999003005005

D	Version No	Default currently
E	Zonal Railway	Northern railway
23	Railway Division	Northern railway Lucknow Division
123456789999	Track asset	Level crossing No 23 A
0030	Chainage in Km	Km 30
05005	Chainage in Meter	Meter 500.5

Annexure - 4

LOCATION OF RFID TAG



**Sample calculation for tentative cost implications
for fixing of RFID tags on NDLS-CSTM route**

Route-NDLS-CSTM, 1538 kilometers

No of stations with 2 lines – 233

No of stations with 3rd line- 23

No of stations with 4th line -18

No of RFID tags required in the entire route- $(4 \times 233 + 2 \times 23 + 2 \times 18) = 1014$.

Cost of tag (in casing) along with writing – 630 +18% GST (As per quotation SureSolutions for Tags of make Omnia)

Cost of tags for NDLS-CSTM route- Rs 7,53,810.

The above rates are for Tags + writing of information on tags only. Fixing of tags to be done by Divisions.

Authorized Signatory